CHINCH BUG CONFERENCE

Hamilton, Illinois. September 8, 1933

Because of the critical chinch bug situation a conference was called by entomologists of the Central West to discuss the situation and plan a program for the coming winter, spring and summer.

Those present included the following:

U. S. Bureau of Entomology: Larimer, Packard and Luginbill.

Missouri: Haseman and Jones

Illinois: Flint, Farrar and Bigger

Iowa: Drake, Decker, Richardson, Harris, Hendrickson, Travis, Ellivor, Tate, Worthington.

Indiana: Davis

Through the courtesy of Maurice Dadant, the conference was held in the Hamilton Club House overlooking the Mississippi above the Keokuk Dam.

W. P. Flint was selected as Chairman and J. J. Davis as Secretary.

Each state representative discussed the infestation in his respective state. See attached map. It was generally agreed that there is every indication that there will be the largest carry-over of chinch bugs this winter since 1887.

Cropping Systems. It was agreed that barley is the most susceptible crop for the first generation of chinch bugs and that barley should be avoided in the chinch bug area. In dairy regions where it is a common practice to grow oats and barley together, the infestation is likely to be severe. Millet is recognized as

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one of the most susceptible crops. Next to barley and millet, oats is the most susceptible of the small grains while rye and wheat are least susceptible to the spring generation of bugs, especially if the stand is good. The bugs are also easier to handle in wheat than in barley or oats.

Complete elimination of small grains will not control the chinch bug. It would be desirable, however, to avoid barley and spring wheat, and reduce the acreage of oats and winter wheat, so far as practicable, in the infested area.

Cooperation among farmers in the location of grain and corn fields is highly desirable.

Growing soy beans in corn is a very desirable practice in chinch bug areas. According to Flint, the growing of soy beans in corn may result in a moderate reduction in corn yield (2-1/2 to 5 bushels per acre) but there is an increase in fertility, aside from the value of the beans if the field is hogged down and in reducing damage by chinch bugs. Flint found that by the use of a soy bean attachment to the planter and planting two beans per hill that yields are increased 5 to 15 bushels per acre in chinch bug areas. Soy beans are not attacked by chinch bugs neither are they repellent, so that a strip of beans between the grain and the corn is not a safe guard from infestation. The presence of soy beans in the corn produces shade which the chinch bugs avoid in laying eggs for the second generation of bugs and in addition may produce conditions which are favorable for the development of the chinch bug fungus. It should also be kept in mind that soy beans in corn does not prevent the immature first generation bugs from

migrating from grain to corn and therefore protection by barriers is desirable to avoid damage by the first generation bugs as they leave the grain.

Spring plowing after the bugs have left winter quarters is likely to releave an infestation of first generation bugs in the corn field if the field is grassy in the spring resulting in the destruction of corn while it is still quite small. Therefore fall plowing of fields for corn is preferable.

Winter Burning. In areas where bunch grass is common the bugs are most likely to winter over in bunch grass and especially along south and west slopes. In other areas where bunch grass is not prevalent, the bugs will be found wintering over in grassy areas or places where there is a good protection of leaves and especially along hedge rows or edge of wood lots on the south and west sides. In pastures the bugs may winter over in sunny spots where there is protection from the north. Few bugs winter over in corn stalks. Old timothy and blue grass pastures where the grass is very bunchy may carry over numbers of the bugs.

Burning may be done at any time during the winter as soon as grass and debris is dry enough to burn. Burning should be practiced only in the heavily infested areas and should be carefully supervised. Where the bugs are overwintering along the south or west border of woodlots, especial care should be taken to avoid burning the trees and it should be remembered that the bugs hibernate only along the south and west edges of such places. If burning is done against the wind it is easier to keep under control

and will burn deeper and therefore increase mortality. Also burning in early winter is preferable to spring burning, as it exposes those bugs, not directly killed by the fire, to the severities of winter.

According to the best figures available, we cannot anticipate better than 25 per cent destruction of bugs by community burning and even under the most favorable conditions not more than 50 per cent.

The quail is recognized as a valuable aid in the control of field crop insects. Therefore in areas where burning is generally practiced it is desirable to substitute artificial protection in the burned over areas. This can be done by using 3 or 4 brush piles and a few corn shocks which is sufficient protection for the quail on 40 acres.

Because of technical difficulties federal unemployment relief labor is not suitable for chinch bug control work, but under some conditions local relief facilities may be utilized by individual farmers.

In order to determine the abundance of overwintering bugs and the exact protection they are selecting in different areas it is highly desirable that surveys be made. Mr. Bigger suggests the following:

1. In fall when bugs are still on corn stalks. Strip leaves from 50 corn stalks in each field.

   Scant = 0 to 3 bugs per stalk
   Moderate = 4 to 12 or 15 bugs per stalk.
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2. In winter, preferably during November, when bugs are in hedges, fence rows, edges of woodlots and in bunch grass. Use 5 square-foot areas in each location.

Scant = 0 to 4 bugs per square foot
Moderate = 5 to 15 bugs per square foot
Abundant = 15 or more bugs per square foot.

3. In spring when bugs are in small grain. Use 5 linear-foot counts per field.

Scant = 0 to 3 bugs per foot
Moderate = 4 to 7 bugs per foot
Abundant = 8 or more bugs per foot.

These last figures refer to mature bugs. When considering immature first brood bugs much larger numbers would be used in calculating abundance.

Barriers. Barriers between the small grain field and corn field to prevent bugs from entering the corn are important in the control of the chinch bug. Oil which acts as a mechanical barrier has not proven satisfactory. A dusty furrow barrier is useful as a temporary means of preventing migration until a more effective barrier is available. The most effective barriers are those which act as a repellent. Coal tar and crude creosotes are the most valuable of the repellents and those materials which contain a maximum of phenols and cresols, as well as naphthalene, are most effective. The Koppers Company, Barrett Company and Riley Coal Tar Products Company put out creosotes at 10 to 15 cents per gallon which are effective. Coal tar by-products from local gas plants are sometimes quite good. This is especially true of the by-product from plants which do not further refine and make use of the material. Water gas is not satisfactory. The only method of determining the effectiveness of coal tar from a specific source is

to test it out on bugs to determine if it is a good repellent.

Aside from the repellent material to be used it is important that post holes be used to trap the bugs, that the bugs be killed each day or two as they are trapped in the post holes and that the line of repellent be placed on an up-grade slope.

Growers should determine whether small grain fields are infested and in case they are infested, plans should be made so that the barrier will be in operation as soon as the bugs begin to migrate. If the bugs have migrated into a few rows of corn before the barrier is up, the barrier should be placed inside the infested rows and the infested corn cut and destroyed.

Insecticides. Where a few rows of corn are infested before the barrier is constructed, a fairly good kill of the bugs on these corn plants can be obtained by dusting with a 4 per cent nicotine dust or a 1-1000 nicotine spray with soap. If the plants are injured so that they are beyond productive recovery, one can spray with pure kerosene, which of course will kill the plants as well as the bugs.

Resistant Varieties. In areas where 110-115 day corn can be used, the varieties Hickshank and Champion White Pearl (White Democrat) have shown a very definite resistance, according to experiments by Flint.

Publicity. Doctor Barriner of the Federal Bureau of Entomology suggested the following aids that could be provided.

Farmers' Bulletin 1498 is available in quantity.

Leaflet or Circular series can be utilized for timely information.

Radio could be utilized as needed, using the National Noon Hour Program of the U. S. Department of Agriculture.

Film strip is available

Press releases.

UNITED STATES DEPARTMENT OF AGRICULTURE

Bureau of Entomology and Plant Quarantine

SECOND CHINCH BUG CONFERENCE

Hamilton, Illinois. September 5, 1934.

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Hamilton, Illinois. September 5, 1934.

The value and success of the chinch bug conference September 8, 1933, and the continued seriousness of the chinch bug in the Central Western States prompted the calling of another conference to discuss the results of experimental work and the past season's control compaign, the outlook for 1935, and plans of procedure.

Those in attendance included the following:

U.S. Bureau of Entomology & Plant Quarantine
- P. N. Annand
- C. Benton
- M. P. Jones
- C. M. Packard
- S. A. Rohwer

Illinois
- J. H. Bigger
- M. D. Farrar
- W. P. Flint
- W. J. Mumm
- L. H. Shropshire

Indiana
- J. J. Davis

Iowa
- L. J. Bennett
- Geo. C. Decker
- C. J. Drake
- E. R. Hensen
- C. H. Richardson
- H. D. Tate
- B. V. Travis
- A. D. Worthington

Kansas
- E. G. Kelly
- R. H. Painter

Michigan
- Ray Hutson

Minnesota
- T. L. Aamodt
- A. G. Ruggles

Missouri
- W. C. Etheridge
- L. Haseman
- Herbert Koch

Nebraska
- O. S. Bare
- L. M. Gates
- Raymond Roberts
- Myron H. Swenk

Ohio
- J. S. Houser
- Harry R. O'Brien
- T. H. Parks

Oklahoma
- F. A. Fenton
- R. O. Snelling

Total attendance - 36

Through the courtesy of Maurice Dadant, excellent facilities for the conference were provided at the Hamilton Club House.

W. P. Flint was named chairman and J. J. Davis secretary.

Each state representative reported on the extent and value of the campaign and on prospects for 1935. Data on creosote used, barriers

maintained, number of demonstrations and attendance, etc., are tabulated in accompanying table. (See p. 3) It is interesting to note that a total of 8,984,366 gallons of creosote were used in the 10 states; 53,184 miles of barriers maintained; 1,470 demonstrations attended by 120,630 farmers were held, the number attending averaging over 82 per demonstration; and the acres of corn saved (not amount protected) by use of creosote barriers was 1,114,644 acres, not including Missouri or Kansas. Figuring the average yield of corn at 30 bushels and the average price 50¢, it is estimated that 33,439,320 bushels of corn were saved, with a value of $16,719,660.00. Including Missouri and Kansas the amount would have been considerably more.

Additional remarks regarding the campaign were made as follows:

Flint (Illinois) estimated 18 acres of corn saved for each mile of barrier maintained. Probably the greatest value of the campaign was the educational value in acquainting the farmers with the fact that barriers could actually be used in a practical way and were effective. The reaction of farmers for the help was excellent and the assistance greatly appreciated. He attributed the success of the campaign to the thorough preparation and organization starting in the fall of 1933 and continuing throughout the winter and spring. Suggestions offered for the 1935 campaign included: Arrangement of a map of the probable area of serious damage in the respective states; a thorough organization with special stress on methods of cropping to prevent chinch bug damage, since effective cropping is far more efficient than barriers and the results are better. Recent observations indicate that the bugs in the northern three-fourths of Illinois are three times as abundant as a year ago.

Davis (Indiana) explained the state chinch bug committee and the organizations within the counties. The county organizations usually included the county agent, and representatives of the Farm Bureau, Corn-Hog Organization, and Wheat Committee. The Farm Bureau, with its efficient organization, was a material aid in the distribution of creosote. In some cases they charged a nominal sum for handling; in other cases they gave their services without charge. It was estimated that at least $1,000,000.00 and perhaps $2,000,000.00 of corn was saved as a result of the creosote barriers at a cost slightly over $100,000.00. The campaign was a decided success, not only in saving many dollars for the farmer but in the educational value, in demonstrating the value of the county agent and the Farm Bureau, the value of the extension method and in developing a more contented feeling among farmers. Farmers felt that the Government was really trying to aid them in their difficult problems. The campaign and distribution of creosote through federal and state agencies was definitely worth while. In the first place, its use definitely protected corn and prevented huge losses which otherwise would have resulted; in the second place, farmers, in most cases, could not have purchased creosote in sufficient quantity to do much good and under such conditions a large number of farmers would have lost much of their corn crop and would have been without feed to carry live stock through the winter. Comments by farmers, newspapers, etc., were very favorable to the work. In commenting on suggestions for 1935, it is urged that extension work be started this fall and if Congress is to provide aid it should available in sufficient advance of the campaign to avoid a late start and a possible failure of the project; otherwise,

		Illinois	Indiana	Iowa	Kansas	Michigan	Minnesota	Missouri	Nebraska	Ohio	Oklahoma	Totals
State Leader		W.P.Flint	J.J.Davis	C.J.Drake	E.G.Kelly	R. Hutson	A.G.Ruggles	L.Haseman	R. Roberts M.H.Swenk	T.H.Parks	C.F.Stiles	
Gallons of Creosote Used	Federal	1,364,338	534,187	2,023,564	435,246	104,154 [2]	20,000	1,147,018 [3]	104,950	198,000	3,600	5,935,057
	State	1,700,112 [1]	145,924	695,273	None	None			None	243,000	0	2,784,309
	Private		Small	200,000	None	Small		50,000	Small	15,000	0	265,000
Total Gallons Creosote Used		3,064,450	680,111	2,918,837	435,246	104,154	20,000	1,197,018	104,950	456,000	3,600	8,984,366
Miles of Barrier Maintained		22,408	7,944	11,861	644	6	100	7,180	1,041	2,000		53,184
Number of Demonstrations		150	111	685	None	11	3	500	?	?	10	1,470
Total Attendance		24,000	11,642	64,000	None	900	28	20,000	?	?	60	120,630
Average per Demonstration		160	105	93	None	82	9	40	?	?	6	82
In Counties Receiving Creosote	Acres Destroyed by 1st Brood Bugs	?	50,950	15,340	29,700	250	10	150,000	?	?	500	
	Percent of corn destroyed by 1st Brood Bugs	4%	3 1/5%	9.35%		<1%	?	3%	?	< 5%	1%	
	Acres of small grain destroyed (excluding drought)	215,350 oats 516,334 wheat	271,883	28,100	9.2%	1,000	100		?	Slight	300	
	Acres corn saved (not amount protected) from use of creosote	403,344	75,000	537,900	?	10,000	20,000		60,000	8,000	400	

1/ Included amount purchased by state and privately together.
2/ All local purchases of gas and coal tar.
3/ Also 42,665 gallons of tar.

it would be better to know early that Congress will not give assistance. It is perhaps too early to predict the chinch bug problem for 1935. However, observations to date show a greater abundance and distribution of bugs than a year ago and there is now every evidence of a serious and more widespread outbreak in 1935 than in 1934. In addition it has been noted that foxtail and crab grass in contract acres is frequently heavily infested and publicity should be given to the importance of plowing-under such areas.

Drake (Iowa) reported the educational value of the campaign as "great." The reaction of farmers was excellent and farmers were much pleased with the CCC help in the construction of barriers. In many cities business men made donations to assist in the work. The reasons for the success of the campaign were the result of carefully planned and organized work and the cooperation of federal and state agencies. Apparently the bugs are now more widespread than a year ago and the situation in general appears more serious than it did a year ago.

Kelly (Kansas) reported that many farmers used barriers who could not buy materials and that they were well satisfied and thoroughly sold on the method of control. Not able to predict the prospects for 1935, although apparently at present the bugs are less abundant than a year ago, probably due to extremely high temperatures.

Hutson (Michigan) reports a successful campaign due to hard work of county agents and availability of barrier material. The reaction of farmers was extremely favorable and secured a contact with farmers who have been unfavorable or indifferent to county agent work. More bugs are present than a year ago.

Ruggles (Minnesota) reports very satisfactory reaction from farmers.

Swenk (Nebraska) reported the success of the campaign as the result of the good attitude of farmers, county officials and county agents, and hard work of state leaders and assistance of Federal Bureau of Entomology. Suggestions for 1935 include: Adequate time and personnel for advance surveys to enable more accurate estimates of need in each county. Definite and dependable early knowledge of available sources of barrier material and more help to handle the educational and administrative work in the counties is needed. Apparently not so many bugs now as a year ago because of the extreme drought and high temperatures.

Haseman (Missouri) reported that the barriers were effective but the drought nullified the value of the barriers. It is his belief that bugs are now less abundant than a year ago and that this is due to the fact that soil surface temperatures reached 157°F., and that practically all corn was in the silo, cut, shocked or dried up before the majority of second-brood bugs were half grown.

Parks (Ohio) reported the educational value of the campaign as very good and that farmers found the barriers worked and were well pleased. The reasons for the success of the campaign were attributed to the high

returns from efforts expended and that effective barrier materials were promptly supplied. The bugs are much more abundant now than a year ago.

Fenton (Oklahoma) reported that farmers needed the help and assisted in the campaign. He suggested that information be furnished on the availability of creosote next year and in ample time to plan barrier operations. Apparently the bugs are not so abundant as a year ago.

Injuries by Creosote

A few cases of burning were reported. When creosote was spilled on the hands or body, prompt washing with water prevented burning. Persons using creosote should be cautioned. Vaseline or axle grease smeared over the hands of those handling creosote is a good preventive. Drake reported death of child in Iowa resulting from explosion of blast burner used to burn bugs in post holes. Flint reported death in Illinois resulting from a farmer attempting to start a siphon and swallowed a quantity of the creosote. In Kansas a child was injured when creosote splashed in the eyes, according to Kelly.

Survey Methods

The survey methods suggested by Bigger (Illinois) and explained in the report of the conference a year ago seemed applicable over a large part of the central west infested area. They are as follows:

1. In fall when bugs are still on cornstalks. Strip leaves from 50 cornstalks in each field.

Scant - 0 to 3 bugs per stalk.
Moderate - 4 to 12 or 15 bugs per stalk.
Abundant - Over 12 or 15 bugs per stalk.

2. In winter, preferably during November, when bugs are hibernating along hedges, fence rows, edges of woodlots and in bunch grass. Use 5 square-foot areas in each location.

Scant - 0 to 4 bugs per square foot.
Moderate - 5 to 15 bugs per square foot.
Abundant - 15 or more bugs per square foot.

3. In spring when bugs are in small grain. Use 5 linear-foot counts per field. The figures to determine infestation refer to mature bugs only.

Scant - 0 to 3 bugs per foot.
Moderate - 4 to 7 bugs per foot.
Abundant - 8 or more bugs per foot.

The above methods seem quite satisfactory and reliable for Illinois and comparable states but might not be suitable for some regions, particular-

ly under such conditions as exist in Kansas. Of the above methods, fall and winter counts (1 & 2) are more important than spring counts (3). In fact, Swenk, Houser, and others report that spring counts made this year gave very poor indication of places where infestations actually occurred. Farrar used square foot samples from several places (favorable and unfavorable). South side of woodlots and in bunch grass were favorable places and indicative. Collections were brought into laboratory and placed in modified Berlese funnels, 10 inches in diameter at top and heated by resistant coils. Worthington used similar methods taking several square foot samples every five miles. Kelly kept record of badly infested corn, kaffir, sudan and similar fields which were most likely localities for winter counts.

It seems likely from comments by several that fall surveys in corn could be conducted hastily and a general idea of possible infestation obtained. This could be followed by a more complete survey especially in the edges of the infested area.

It was explained that bugs are already migrating to hibernating quarters and that migration would continue until November. Publicity should be given to the fact that winter weather is not likely to have an appreciable harmful effect on the bugs. Continuous light rains or shorter heavy rains the last two weeks in May and first three weeks in June are conditions most likely to check chinch bug increase.

Rohwer explained the need of early information on the infestation in the different states and requested workers to report on early fall infestation surveys as soon as made and later to report promptly on late fall or winter surveys. Reports, which should be sent to Washington direct, should be prefaced with a statement indicating the extent of the survey.

Winter Burning

Kelly (Kansas) reported that 85 percent of the bugs hibernate in what they call clump grasses and along woodlots and roadsides, especially near heavy infestations of the previous season. Bugs do not hibernate very successfully in corn refuse, stalks, cow chips, sticks, etc. Burning kills 40 to 60 percent of bugs and if done in the fall the burning will remove the protective plant residue covering, resulting in a final kill of 94 percent. It was explained that burning against the wind is important. The practical value of burning under Kansas conditions was demonstrated the past year. Extensive burning was practiced in the late fall and winter of 1933 and as a result barriers were not necessary this year in the well-burned areas. It was also noted that the effects of burning are cumulative.

Haseman (Missouri) reported burning not so successful as in Kansas but that it is considered of value and worth while.

Worthington (Iowa) stated that there was no definite campaign of burning in Iowa but that it was suggested as one means of destroying bugs and a considerable amount of burning was done last winter. In some areas probably of value but seems impractical in most areas of the infested

region because there is so many hibernating areas that cannot be burned. It was also reported that the Fish and Game Commission of Iowa does not oppose burning where properly supervised.

Kelly stated that the Kansas Game Warden questioned burning in the beginning but after they had made a careful investigation they decided that burning for chinch bugs had no noticeable effect on bird life.

Fenton (Oklahoma) reported studies showing 78.9 percent survival where no burning was done and only 7 percent survival in burned areas. Plowing experiments resulted in no value for 1 to 2 inch plowing, fairly effective at 3 inches, nearly complete control with 4 inch plowing and complete control with 5 and 6 inch plowing. In Oklahoma officials are opposed to burning.

Reports from Ohio, Indiana, and Illinois were in general agreement that burning shows no measurable value east of the Mississippi River and could not be strongly recommended because: 1, Difficulty in securing co-operation over large areas; 2, unfavorable conditions for burning; 3, large areas suitable for hibernating bugs which cannot be burned; 4, injury to fence posts and wire when fence rows burned; 5, low kill; 6, objections from conservation and game interests.

It was the general opinion that, as a rule, emergency relief labor was not suitable for burning campaigns.

Davis called attention to the hazard resulting from the large acreage of unused land, especially contract land. Much of this land may serve as favorable places for the hibernation of the chinch bug and other crop pests. Farmers should be urged to burn and/or deeply plow such areas.

Burning of pastures not advised.

Cropping Programs

A general discussion of the problem brought out the following general conclusions:

1. Elimination of wheat, rye, and barley in any region would not appreciably reduce chinch bugs the following year.

2. Elimination of all small grains, including oats, would not eradicate the chinch bug menace and the value derived is questionable, even if all farmers over a large area followed the practice.

3. Rye for fall pasture would likely be destroyed by bugs if sowed in an infested cornfield. If planted away from an infested field it might not be destroyed although Bigger reports pastured rye as being ideal for bugs.

4. In corn canning or trucking regions it might be practical to eliminate all small grain and substitute soy bean and other non-host crops.

5. In wheat and field-corn growing regions, put wheat on strongest land, adding fertilizer as necessary, using good seed, and providing a good seed bed to secure a uniform, vigorous stand of wheat, which will not be attractive to bugs the following spring. At the same time put in the minimum acreage of wheat and corn and the maximum acreage of soy beans.

6. So far as practicable, grow a maximum acreage of non-host crops.

7. In chinch bug areas it is unwise to sow wheat in standing corn or in cornfields with shocks of corn. In such fields there is considerable litter on the ground and there will be open places and thin stands in the field the following spring, which are ideal conditions for the bugs. Although the sowing of wheat in standing corn and where corn shocks are placed is a common practice, it is not recognized as a good agronomic practice. Regardless of where wheat is sown, the fly-free date should be adopted.

8. Soy beans in corn is recognized as a good practice in chinch bug areas to avoid infestation and damage by second-generation bugs.

9. Etheridge (Missouri) reported early winter barley maturing about May 20 not injured. Apparently not sufficient evidence to recommend.

10. It was suggested that a band of Korean lespedeza around a corn field might act as a protection, the tangled matting of lespedeza making it impossible for the bugs to cross. However, this is probably not true. Furthermore, there is evidence that this crop offers very good conditions for hibernation of the bugs.

Trap Crops

Studies to date do not warrant recommending trap crops.

Barriers

Under practically all conditions creosote barriers were effective where properly made and maintained. Creosote according to Federal specifications seems to be outstanding and holds up better than any other barrier material, considering availability, durability, and cost. Farrar believes that it might be desirable to increase viscosity a few seconds. Flint warned against too high a viscosity, which might "glaze" over when applied. Houser advises that the total creosote content might not be a good criterian as the creosote in some oils is so locked up that the repellent efficiency is reduced. Local supplies of coal tar were effective in some cases and worthless in others.

Some of the reasons where creosote barriers were ineffective are as follows: Failure to use post-holes or to construct them properly, difficulty in making post-holes in lumpy soils or extremely dry soils, improper slope, improper placement of creosote line, failure to place barrier far enough in cornfield, failure to maintain barrier after original construction, failure to apply enough labor to secure proper construction of barrier.

Decker (Iowa) discusses experimental work with paper barriers. Corrugated paper cut in 4½ inch width strips seems best. Red rosin paper is half the cost of corrugated paper but the latter is the more practical. Paper is soaked overnight in creosote. In placing the paper barrier a furrow is plowed using the large plow of a cultivator. The paper is then placed and the furrow filled in. Creosote is applied to the paper every day or two. Perhaps only half the creosote is needed as for standard creosote barrier and less cost for labor but the added cost of paper makes total cost of standard and paper barriers about the same. (For more complete details see Jour. Econ. Ent. 1934, p. 854.).

Iowa expects to recommend the paper barrier in 1935. Flint stated that, on basis of 1934 experiments in Illinois, he will recommend paper barriers next year as being equally effective as the standard furrow creosote barrier. It was indicated that certain paper companies might place creosote impregnated paper on the market. Several reasons were expressed that paper companies should not attempt to put out ready-prepared creosote paper.

In answer to an inquiry it was stated that the cresols, phenols and naphthalamines were the repellent ingredients in chinch bug creosote oil.

Emergency Crops for Combating Second-Brood Bugs

Flint stated that some susceptible crops can be successfully planted late enough to produce a crop and escape the second-brood bugs. He reported on experiments with sudan grass at Urbana, Illinois, as follows:

Sudan grass planted at 10 to 14 day intervals, beginning May 10 and continuing until the middle of August. May 10 planting produced good first crop but second crop was destroyed by bugs. May 24 planting with and without soy beans made good crop. Plantings August 1 and thereafter in 1933 and plantings August 10 and thereafter in 1934 made good crops and no damage by bugs. May 21 planting (10 lbs. sudan grass seed to 1½ bushels soy beans per acre) was successful. Mid-season plantings (after May 21 and before August 1), with and without soy beans, were destroyed by bugs.

Insecticides

Richardson (Iowa) reported on an extensive series of insecticide experiments, in an attempt to find something really practical. Even a 20 percent kerosene emulsion with fish oil soap and also with naphthalene did not give satisfactory kill and burned plants. In the field, nicotine sulphate, 1 to 400, with 0.3 percent commercial potassium oleate gave 75 to 90 percent kills of mixed groups of old and young bugs. Pyrethrum and rotenone extracts did not give entirely satisfactory control and rather costly at effective strengths. Derris extracts were considerably more toxic than rotenone and were effective down to .005 percent of rotenone content. Calcium cyanide fairly successful at 300 pounds per acre but severe injury to the corn resulted. From the results obtained no definite recommendations can be made. Spraying may be useful for valuable experimental plots or where a considerable acreage will be protected by spraying a few rows.

Shropshire (Illinois) stated that better controls were obtained spraying corn by using a Bordeaux nozzle instead of a disk nozzle.

Painter (Kansas) reported better results with derris dusts than with nicotine and Grandpa's Tar soap. Calcium cyanide dust successful in wheat plots. Hot water (130° to 165°F.) splashed on plants was effective with little injury to corn.

Haseman reports best results in Missouri with nicotine and lime dust (1 to 2 oz. to a pound of lime), not only killing but also acting as a repellent for a short time. However, considered too expensive. Flint used 6 lbs. nicotine sulphate to 94 lbs. of lime.

Resistant Varieties of Corn

Mumm and Bigger reported on Holbert's Illinois studies which have produced inbred strains and hybrids which apparently carried resistant characters during past two years of observations and are again this year consistently resistant. It should be noted that they show resistant qualities to second-brood bugs only.

Painter (Kansas) reported on studies with resistant sorghums in Kansas. Sorghums have been consistently resistant since the twentys. Atlas, a sweet sorghum put out by Kansas, is the most resistant variety in southeastern Kansas.

Educational Publicity

Discussed importance of putting out seasonal and frequent publicity statements.

The importance of complete fall and winter surveys was again stressed.

Report of Resolutions Committee

The following Resolutions are hereby presented:

RESOLVED: That we extend our appreciation to the U. S. Bureau of Entomology and to P. N. Annand and B. M. Gaddis and their associates at the Minneapolis office in particular, for the very efficient way in which they served the various states during the recent chinch bug control compaign.

RESOLVED: That we extend to Maurice C. Dadant our appreciation for securing the Club House facilities and making necessary local arrangements for this meeting.

RESOLVED: That we extend our appreciation to W. P. Flint for his untiring efforts in organizing and arranging for this conference.

L. Haseman
E. G. Kelly
T. H. Parks, Chairman of Committee

Conference adjourned at 5:00 p.m.

J.J. Davis,
Secretary.